

C_04 Key Factoring Example Only

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Decomposition AC Method

Factoring Practice

Example Factor $4x^2 - 3x - 7$

Solution: The first step is to multiply the first and last coefficients: $(4)(-7) = -28$. We need the factors of -28 whose sum is -3. The factors of 28 are: 1 & 28, 2 & 14, and 4 & 7. The factors needed are 4 & -7 (remember the sum must be -3). We now re-write the middle term of the trinomial and factor by grouping:

$$\begin{aligned} &4x^2 - 3x - 7 \\ &4x^2 + 4x - 7x - 7 \\ &4x(x+1) - 7(x+1) \\ &(x+1)(4x-7) \end{aligned}$$

1) $7m^2 + 6m - 1$

$AC = -7$
 $B = 6$
 $(-7, -1)$

$$\begin{aligned} &7m^2 + 7m - 1m - 1 \\ &= 7m(m+1) - 1(m+1) \\ &\boxed{(m+1)(7m-1)} \end{aligned}$$

2) $3k^2 - 10k + 7$

$AC = 21$
 $B = -10$
 $(-3, -7)$

$$\begin{aligned} &3k^2 - 3k - 7k + 7 \\ &= 3k(k-1) - 7(k-1) \\ &\boxed{(k-1)(3k-7)} \end{aligned}$$

3) $3n^2 - 16n + 20$

$AC = 60$
 $B = -16$
 $(-10, -6)$

$$\begin{aligned} &3n^2 - 10n - 6n + 20 \\ &= n(3n-10) - 2(3n-10) \\ &\boxed{(3n-10)(n-2)} \end{aligned}$$

4) $2r^2 + 7r - 30$

$AC = -60$
 $B = 7$
 $(12, -5)$

$$\begin{aligned} &2r^2 + 12r - 5r - 30 \\ &= 2r(r+6) - 5(r+6) \\ &\boxed{(r+6)(2r-5)} \end{aligned}$$

5) $5x^2 - 14x + 8$

$AC = 40$
 $B = -14$
 $(-10, -4)$

$$\begin{aligned} &5x^2 - 10x - 4x + 8 \\ &= 5x(x-2) - 4(x-2) \\ &\boxed{(x-2)(5x-4)} \end{aligned}$$

6) $4x^2 - 4x - 15$

$AC = -60$
 $B = -4$
 $(-10, 6)$

$$\begin{aligned} &4x^2 - 10x + 6x - 15 \\ &= 2x(2x-5) + 3(2x-5) \\ &\boxed{(2x-5)(2x+3)} \end{aligned}$$

Factoring Practice

(Shortcut AC Method)

1) $7m^2 + 6m - 1$

$$\begin{array}{l} AC = -7 \\ B = 6 \\ \textcircled{-7, -1} \end{array} \quad \begin{array}{l} \left(\frac{7m}{7} + \frac{7}{7}\right)(7m - 1) \\ \boxed{(m+1)(7m-1)} \end{array}$$

2) $3k^2 - 10k + 7$

$$\begin{array}{l} AC = 21 \\ B = -10 \\ \textcircled{-3, -7} \end{array} \quad \begin{array}{l} \left(\frac{3k-3}{3}\right)(3k-7) \\ \boxed{(k-1)(3k-7)} \end{array}$$

3) $3n^2 - 16n + 20$

$$\begin{array}{l} AC = 60 \\ B = -16 \\ \textcircled{-10, -6} \end{array} \quad \begin{array}{l} (3n-10)\left(\frac{3n-6}{3}\right) \\ \boxed{(3n-10)(n-2)} \end{array}$$

4) $2r^2 + 7r - 30$

$$\begin{array}{l} AC = -60 \\ B = 7 \\ \textcircled{12, -5} \end{array} \quad \begin{array}{l} \left(\frac{2r+12}{2}\right)(2r-5) \\ \boxed{(r+6)(2r-5)} \end{array}$$

5) $5x^2 - 14x + 8$

$$\begin{array}{l} AC = 40 \\ B = -14 \\ \textcircled{-10, -4} \end{array} \quad \begin{array}{l} \left(\frac{5x-10}{5}\right)\left(\frac{5x-4}{3}\right) \\ \boxed{(x-2)(5x-4)} \end{array}$$

6) $4x^2 - 4x - 15$

$$\begin{array}{l} AC = -60 \\ B = -4 \\ \textcircled{-10, 6} \end{array} \quad \begin{array}{l} \left(\frac{4x-10}{2}\right)\left(\frac{4x+6}{2}\right) \\ \boxed{(2x-5)(2x+3)} \end{array}$$